PLANE TRIGONOMETRY

Thursday, June 23, 1932

Write at top of first page of answer paper to part II (*a*) name of school where you have studied, (*b*) number of weeks and recitations a week in plane trigonometry.

The minimum time requirement for plane trigonometry is five recitations a week for half a school year, or the equivalent.

Part II

Answer four questions from this part, selecting two questions from each group.

Group I

Answer two questions from this group.

21 A flagstaff known to be 20 feet long stands on top of a building. An observer across the street notes that the angle of elevation of the bottom of the staff is 69° 14′ and the angle of elevation of the top of the staff is 76° 44′. What is the height of the building above the eye of the observer? [12½]

22 Given the sides of a triangle $a = 34.25$, $b = 52.45$, $c = 71.40$; find the angles correct to the *nearest minute*. [12½]

23 The town A is 25.2 miles due north of B, and the town C is 18.3 miles N. 37° 20′ E. of B. What is the direction from A to C? [Note — Give your answer in the form S. ... E.] [12½]

Group II

Answer two questions from this group.

24 The lengths of the sides of a right triangle ABC are $AC = 28$, $BC = 21$, $AB = 35$. On the hypotenuse AB another right triangle ABD is constructed with AB as one leg, BD equal to 5 as the other leg and AD as hypotenuse. Show that the angle CAD is exactly 45°. [Suggestion — Find tan CAD, using the formula for the tangent of the sum of two angles.] [12½]

25 Find to the *nearest minute* the angle between 90° and 180° that satisfies the equation

$$3 \cos x + \tan x = 3 \sec x \qquad [12\tfrac{1}{2}]$$

26 *a* Prove the following identity:

$$(1 + \sec x)(1 - \cos x) = \cos x \tan^2 x \qquad [6]$$

b Prove the law of sines for an acute triangle. [6½]